Advisory Council on Science and Technology
Conseil consultatif des sciences et de la technologie

SUPPORTING DOCUMENT 11 EXECUTIVE SUMMARY

# Checking the Brain Drain: Evidence and Implications

Prepared for the Expert Panel on Skills
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February 1999

Canada

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# Executive Summary
# Checking the Brain Drain: Evidence and Implications

John F. Helliwell, UBC

## Purpose of Study

To pull together available information on the size and nature of migration from Canada to the US, and to assess the quality and reliability of this data as a basis for policy recommendations.

## Highlights

### *Migration Levels*

Canadian-born workers who migrated to the US since 1990 and are still there now, has averaged about 10,000 per year, about half of whom have university degrees. Flows in the 1990s are not large compared to those in the 1950s and 60s.

### *Mobility of skilled labour:*

The highly skilled are much more mobile than are those with less education, but even the highly skilled are far more mobile within their country of origin than between countries, by at least an order of magnitude.

Movements of educated Canadians to the US in the 1990s were surprisingly small given clear increases in the movements of goods, services, and temporary workers in the wake of the FTA. Increases in the educational pay premium in the US, the increasing relative supply of Canadians with higher education, and lower unemployment rates in the US suggest that there should have been a larger increase.

### *Sources of migration:*

Offsetting factors stimulating migration include the widening gap in employment opportunities between Canada and the US in the 1990s and generally lower costs of international travel and communications.

### *Projections of migration:*

Migration of some high technology workers and university-based researchers will likely be reduced as the relative supply situation becomes more similar in the two countries, driven by reduced fiscal pressures and retirements in Canada, and reduced excess demand in the US.

***Tax changes and migration***

- It would be a mistake to use the brain drain as a spur for changes to taxes and expenditures that did not otherwise pass the tests of economic and political logic. The numbers involved are small enough that they are not likely to have a large or long-lasting effect on the availability of skills in Canada.

***Need for training and employment:***

- Any brain drain of the highly skilled increases the importance of providing a stable and sustainable environment for the training and employment of all workers, especially those in fields where there are positive national spillovers from domestic employment.

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DOCUMENT D'APPOINT
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# Étude sur l'exode des cerveaux : Les données existantes et leur signification

Préparé pour le Groupe d'experts sur les compétences
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Février 1999

Canada

## Sommaire

## Étude sur l'exode des cerveaux : Preuves et conséquences (Checking the Brain Drain: Evidence and Implications) John F. Helliwell, UBC

### Objet de l'étude

Rassembler l'information disponible sur l'ampleur et la nature de la migration du Canada aux États-Unis et évaluer la qualité et la fiabilité de ces données comme base de recommandations de politique.

### Faits saillants

***Niveaux de migration***

Depuis 1990, quelque 10 000 travailleurs nés au Canada ont émigré aux États-Unis tous les ans et y sont encore. Environ la moitié d'entre eux ont un diplôme universitaire. Les flux dans les années 90 ne sont pas élevés par rapport à ceux des années 50 et 60.

***Mobilité de la main-d'oeuvre qualifiée***

Les employés très qualifiés sont beaucoup plus mobiles que les employés moins instruits, mais même les employés très qualifiés sont nettement plus mobiles dans leur pays d'origine qu'entre les pays, d'au moins un ordre de grandeur.

Les mouvements de Canadiens instruits vers les États-Unis dans les années 90 ont été étonnamment faibles, compte tenu des hausses évidentes du mouvement des biens, des services et des travailleurs au lendemain de l'Accord de libre-échange. Les hausses, aux États-Unis, de la prime de rémunération liée aux études, l'augmentation de l'offre relative de Canadiens plus instruits et les taux de chômage plus bas aux États-Unis auraient dû provoquer une augmentation plus prononcée.

***Sources de migration***

Les facteurs compensatoires qui ont stimulé la migration comprennent l'écart grandissant entre les possibilités d'emploi au Canada et aux États-Unis dans les années 90 et les coûts généralement plus bas des communications et des déplacements internationaux.

***Projections de la migration***

La migration de certains travailleurs de haute technologie et de chercheurs universitaires sera probablement réduite lorsque la situation relative de l'offre deviendra plus semblable dans les deux pays, à la faveur de l'atténuation des pressions budgétaires et des départs à la retraite au Canada, ainsi que de la réduction de la demande excédentaire aux États-Unis.

***Changements fiscaux et migration***

- On aurait tort de se servir de l'exode des cerveaux pour justifier des changements fiscaux et des modifications des dépenses qui, autrement, ne passent pas le test de la logique économique et politique. Les chiffres en cause sont assez faibles pour ne pas avoir d'effet important ou durable sur l'offre de compétences au Canada.

***Besoin de formation et emploi***

- Tout exode des cerveaux accroît l'importance de créer un environnement stable et durable pour la formation et l'emploi de tous les travailleurs, en particulier dans des domaines où l'emploi national a des conséquences indirectes positives à l'échelle nationale.

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## Introduction

It has been suggested that recent international migration, and especially migration from Canada to the United States, has had large effects on the supply of skilled workers in key sectors of the Canadian economy. Referred to as a brain drain, the exodus has been traced to many causes, and has led to proposals ranging from exit taxes to recoup post-secondary education subsidies for the leavers to major reductions in income tax rates to encourage them not to leave. Since there is a risk that the public perceptions and policy discussions have been based on rather scattered and disparate sources of information, this paper attempts to draw together the available evidence on the size and nature of the migration from Canada to the United States.

There are four main sections in the paper. Section 2 attempts to quantify recent migratory flows from Canada to the United States, and to make their relevance clearer through comparisons with earlier migration from Canada to the United States, migration from other countries to Canada, and migration from other countries to the United States. To the extent feasible, data will be presented for migrants with higher education, as these have been the focus of past and current policy interest in Canada and other countries. Section 3 surveys evidence of the relative importance of factors determining migration, especially of those with higher education and skills, while section 4 assesses the scantier evidence of the extent to which public policies have had an effect on these migrations. Finally, section 5 summarizes the key features of the evidence, and draws possible implications for future research and policies.

## How Big is Migration from Canada to the United States?

Migration from Canada to the United States is best estimated from the US census and the U.S. Current Population Survey (CPS), since these provide the best means of avoiding double-counting while giving full account to the stock of Canadian-born workers employed (or being educated) temporarily in the United States. Flows of migrants in the 1990s will be compared to earlier flows from Canada to the United States, from other countries to the United States, and from other countries to Canada. The comparison between flows from Canada to the United States and those from other countries to Canada is important in helping to assess the net costs and benefits to Canada from international migration of skilled workers. Attempts will be made to explain any apparent differences among available estimates of the brain drain from Canada to the United States.

There is a widespread perception that large and growing numbers of Canadians have been migrating to the United States. Because this perception appears to be so widely held, and accepted as fact, one might expect that it would quickly emerge from a review of population statistics. Thus it may come as a surprise to find, at least at the aggregate level, that the widespread perception is not supported by the numbers. There has instead been over the past thirty years a steady continuation of the century-long downward trend in the number of Canadian-born residents of the United States. As shown in Table 1, there were 843,000 Canadian-born residents of the United States in 1980, 772,000 in 1990, 679,000 in 1994 and 542,00 in 1997. Preliminary data from the March 1998 CPS show 583,000 Canadian-born residents of the United

States. Canadian-born migrants to the United States have not been numerous enough to replace those returning home, dying, or leaving the United States for a third country. As already noted, the current decline in migration continues a trend that covers the century. Measured as a share of the Canadian population in the same year, the number of Canadian-born living in the United States has fallen from more than 16% in 1910 and 12% in 1930 (Truesdell 1943, 19) to 3% in 1980 and less than 2% in the late 1990s.

Using Canadian census data to evaluate the flows helps to round out the picture by permitting immigration and emigration flows to be compared, although the emigration data are measured residually, and are probably subject to a higher margin of error. As shown in Table 2, Canadian census data for the last 150 years show the ratio of emigrants to immigrants, averaged over five or ten-year inter-census periods, to range from a minimum of 20% (in 1991-1996) to a maximum of more than 150%, in the latter part of the nineteenth century. During each of the four census decades between 1860 and 1900, emigration exceeded immigration, while for most of the 20th century (with the sole exception of the 1930s), immigration has exceeded emigration, with net immigration being largest in the two most recent inter-census periods, 1986-1991 and 1991 to 1996. In light of the special attention paid to migration of the highly skilled, it is noteworthy that the 1991-1996 census data for total immigration and emigration are matched very closely by Statistics Canada data for university graduates. The proportions of the highly educated are higher among both immigrants and emigrants than among the population as a whole, reflecting the higher mobility of those with more education. Statistics Canada estimates that the annual inflows of university graduates immigrating to Canada are four times or more higher than the number of graduates moving from Canada to the United States. There is a similar pattern for higher degrees as well, with immigrants holding masters and doctoral degrees outnumbering emigrants holding bachelors, masters and doctoral degrees combined.

It is also helpful to compare the trends in Canadian-born residents of the United States with migration from other countries to the United States. The declining numbers of Canadian-born are matched by declining numbers of those born in the countries of Western Europe, and increasing numbers of those from poorer countries. For the Canadian-born living in the United States at the time of the 1990 census, as for the German-born and Italian-born, more than half arrived before 1960 and three-quarters before 1970. By contrast, for those U.S. residents born in Mexico or the Philippines, more than three-quarters arrived since 1970 (United States 1998).

Over the second half of the 20th century, there has been a significant narrowing in the per capita income gap between the United States and both Canada and the industrial countries, thus lowering the economic incentive to migrate from Canada to the United States, or from Western Europe to either Canada or the United States. The economic incentives to move from any of the richer industrial countries to the United States are far smaller than they were in mid-century, and the flows are themselves correspondingly smaller. The importance of different countries as sources for migratory flows to North America, both to the United States and to Canada, has shifted from Western Europe to poorer countries, for two reasons. The reduced flow from Western Europe reflects the fact that convergence to US (and Canadian) standards of living has proceeded much faster and further in Western Europe than in the rest of the world, while the increased flow from poorer countries has been facilitated by changes in immigration policies to

reduce the importance attached to ethnicity or country of origin. Canada plays an interesting middle role in these migratory patterns, being an even larger recipient of net migrants (as a share of population) than the United States, while also continuing its traditional role as a net provider of migrants to the United States.

Although the aggregate data are helpful, they do not fully address concerns about migration of those in highly skilled occupations. Emphasis on the highly skilled, with education type and level being used as the principal measure of skill, has been at the centre of brain drain discussions, not only in Canada in the 1990s, but in many countries over several decades. Widespread concern about brain drains to the United States in the 1950s and 1960s, from industrial and developing countries alike, led to special studies in several countries[1]. These earlier studies provide some data suitable for comparing current and past flows, and for considering the Canadian case in a more global context.

The 1960s data can be compared with 1990s data for at least some brain-drain categories to put the current migration in some historical context. Two groups which have been fairly carefully tracked in both the 1960s and 1990s discussions are scientists and engineers, with the latter group being substantially the larger of the two, both in terms of numbers of graduates and number of emigrants to the United States, during both time periods. DeVoretz and Laryea (1998, Table 7) calculate that 1993-94 migrants from Canada to the United States were 6.3% as many as 1991 Canadian engineering graduates, with the corresponding figure being 14.5% for scientists and 8% for the two groups combined[2]. Grubel and Scott (1977, Table 7.2) do a similar calculation for the sum of scientists and engineers averaged over the years 1957 to 1961. They find the earlier brain drain to be more than three times as large as DeVoretz and Laryea's estimate for the 1990s, with the average number of scientists and engineers migrating from Canada to the United States equal to almost 30% of the number of Canadian first degrees granted in science and engineering over the 1957-61 time period. For engineers considered separately (Grubel and Scott 1977, Table 7.3), the ratio was even higher, averaging almost 46% over the five-year period 1957-61. This is twenty-five times greater than the Statistics Canada estimate of the percentage of new engineers leaving Canada for the United States in the 1990s.

Grubel and Scott calculated comparable emigration ratios for several other source countries sending trained brains to the United States, and found the proportions much higher for Canada than for other countries. They also found that during the 1957-61 period more than half of the scientists and engineers emigrating from Canada to the United States were born in countries other than Canada, while for most other source countries the reverse was true. However, the total size of the flow from Canada to the United States was large enough that Canada still ranked as the number one source of native-born scientific and engineering graduates to the United States, when

[1] See United Kingdom (1968), United Nations (1968), United States (1968) and other studies cited in the bibliography prepared by Grubel and Scott (1977).

[2] Analysis by Statistics Canada suggests that the DeVoretz and Laryea estimates are misleadingly large, since many of the emigrants do not have university degrees. Statistics Canada calculates that average annual emigration of engineers from Canada to the United States 1990-1996, at 527, was only 1.8% as large as the annual new supply, as represented by new entrants from the education system, re-entrants to the labour force, and immigrants. For computer scientists, they calculate the corresponding emigrant percentage as 0.8%.

measured as a proportion of the source-country's population, and number 3 as a proportion of source-country students in those disciplines. However, Grubel and Scott show that this high rank was largely due to Canada being a generally high provider of migrants to the United States, and not because there was an unduly high proportion of the highly educated in the flow of the Canadian-born to the United States[3].

The data presented thus far indicate that recent flows of migrants from Canada to the United States, whether considering total migration or movements of the highly educated, are less than a quarter as large as those in the 1960s, and in all recent decades have been much smaller than the inflows from other countries to Canada. In terms of numbers, it would appear there is a brain gain rather than a brain drain.

But what of the possibility that the best are leaving, and are not being adequately replaced by those arriving from elsewhere? This risk forms the basis of DeVoretz and Laryea's calculation of 'churning costs', which is their term to describe the extent to which the skills and wages of migrants to Canada are not as large, either per person or in the aggregate, as those of skilled migrants from Canada to the United States. Their aggregate estimate of the present value of these costs is $11.5 billion, and represents by far the largest part of their $11.8 billion estimate of the total costs of the brain drain. The DeVoretz and Laryea calculations depend on the numbers of skilled immigrants and emigrants and their average quality. An evaluation of the DeVoretz and Laryea calculations by Statistics Canada suggests that there are material problems with their methodology. The two most significant difficulties relate to the comparability of the numbers of skilled immigrants and emigrants, and the presumed paths of future incomes.

According to the Statistics Canada analysis, DeVoretz and Laryea use non-comparable definitions for skilled immigrants and emigrants, with the result of materially undercounting the number of skilled immigrants. This happens first because they treat US immigration statistics for managerial workers as though the migrants are all highly educated[4], while making no comparable adjustment for immigration to Canada. Second, they treat all scientists and engineers emigrating to the United States as being highly skilled, regardless of whether or not they have any professional qualifications beyond a first degree, while they exclude bachelor's degree holders from their figures for the matching inflows[5]. This non-comparability is compounded when DeVoretz and Laryea use salary differentials which compare the salaries of the wider group of immigrant scientists, including those with only undergraduate degrees, with those of emigrants to the United States. The Statistics Canada analysis shows that when comparable methods are used to value the skills and numbers of the immigrants and emigrants, the value and number of the immigrants much

[3] Grubel and Scott (1977, Tables 9.2 and 9.3) compare the migration of scientists and engineers from various countries to the United States as shares of total students in those disciplines in the source countries, and as shares of total migration to the United States. Canada ranked 3 of 48 source countries by the first measure, and 16 by the second measure.

[4] This is quantitatively important, as U.S. Census data show that 56% of Canadian-born managerial workers in the United States do not have any university degree.

[5] This is also an important asymmetry, as DeVoretz and Laryea estimate Canadian immigrants in science occupations 1989-96 to be 20,726, while Statistics Canada estimates immigrants in science occupations to be 64,990, even after removing all those who might be considered as technologists and technicians.

exceeds that of the emigrants[6]. It is nonetheless likely, even with comparable evaluation procedures, that the average incomes of the emigrants is likely to exceed that of the immigrants,[7] reflecting Canada's traditional role as an entrepot for US-bound migrants, as well as the greater relative skill premium in the United States.

Another useful source of data on migration of educated Canadians to the United States is available from records of the current addresses of most of the living graduates of the University of British Columbia. Results for bachelors and PhDs living in Canada and the United States are shown in Figures 1 and 2. Preliminary analysis of both bachelor's and PhD degree holders suggests that recent graduates are less likely to be living in the United States than are graduates from earlier decades. Graduates from all decades are far more likely to be living elsewhere in Canada than in the United States, and far more likely still to be in British Columbia. For example, the data for bachelors degrees show each of the 32 U.S. states most likely to be a home to U.B.C. graduates has an average of 12 graduates from the total of 1990-1997 graduates, compared to 32,000 in B.C. and an average of 231 for each of the other Canadian provinces. This difference is even more striking when account is taken of the fact that the 32 states are, on average, 10% closer to B.C. and have economies that are almost three times as large as the average for other Canadian provinces. When these differences are factored in, by use of the gravity model[8], a U.B.C. bachelor graduate of the 1990s is about 70 times more likely to be living in another Canadian province than in a U.S. state of similar size and distance. He or she is far more likely still to be living in British Columbia. The data for the addresses of PhDs show a far more cosmopolitan mix of addresses. This is what would in general be expected, as PhD programmes attract their students from all over, and they often migrate after graduation, whether to return home, to move to a third country, or simply to chase job openings that become more few and more scattered as the degree of specialization increases. As shown in Figure 2, which shows UBC PhDs with North American addresses, there is some sign of increasing US residence in the 1990s, although this increase is far less than that evident in the numbers of PhDs staying in British Columbia. The analytical work on these data is just beginning, but the raw numbers suggest two things. First, there is no general tendency for graduates in more recent decades to move to the United States; indeed, the data in Figure 1 mirror the population based estimated from the US census. Second, there has been a sharp growth in the supply of new PhDs, with the local BC and US economies being the fastest growing destinations.

The remaining task for this data section is to consider the data for temporary workers that have shown such remarkable growth since 1990, and which have played an important role in recent

[6] DeVoretz and Laryea (1998) base their large estimate of churning costs on evidence that recent immigrant male workers have had salary profiles that remain below those of Canadian-born workers with similar education levels long after the date of immigration. The Statistics Canada research argues that this differential is not there for female workers, an increasing share of the total, and that for many highly skilled groups, e.g. computer scientists, the salary gap is removed within a few years even for males.

[7] Borjas (1992) argues that the salary gap for recent immigrants, which also appears in U.S. data, is a function largely of the change in the pattern of source countries, with immigrants from poorer countries generally having skills and education that are less easily transferred to the workplaces of the United States.

[8] See Helliwell (1998) for an explanation of the gravity model, and for applications explaining migration between Canada and the United States.

Canadian public discussions of a brain drain to the United States. DeVoretz and Laryea (1998, Table 3) report the number of non-immigrant professionals admitted to the United States under the provisions of the FTA and NAFTA as rising from less than 3,000 in 1989 to more than 16,000 in 1993 and nearly 27,000 in 1996. They argue that this fast-growing category has become an increasingly popular first step for permanent migration, and is thus an early indicator for future migration. There are, however, sufficient problems with this series to render it a poor indicator of either temporary or permanent migration to the United States. First, the category they report is new under the FTA and NAFTA. It was zero before 1989, and acquired much of its growth by transfer from other categories. Thus the total for all entries of temporary workers from Canada to the United States, including the series used by DeVoretz and Laryea, rose from 46,976 in 1989 to 62,199 in 1996, implying that most of the growth in the FTA/NAFTA series came through transfer from other categories. Second, there is some doubt about the extent to which the series contains, even in the same year, more than one entry for the same person. Third, the series will capture people who are only spending a few days in the United States, and hence the total will not represent the likely number of Canadians working in the United States at any given time. Fourth, the United States has since 1990 strengthened the requirement for temporary professional visitors to have visas if they are to do any business in the United States. This has increased the number of temporary visas issued without thereby implying any increase in the actual number of temporary workers. In the light of these large but not yet adequately measured biases in the FTA/NAFTA series, they are not a reliable guide to either current or future emigration numbers. Collaborative efforts between U.S. and Canadian statistical agencies are underway to establish more clearly what these series measure, and how they should be related to migration and census data. In any event, the temporary flows should be given less importance than the CPS and Census data, which measure the number of Canadian-born actually living and working in the United States, including both temporary and permanent migrants.

Thus the best estimate of the cumulated 1990s flows of Canadian-born migrants to the United States, temporary and permanent alike, is probably that provided by the U.S. Current Population Survey, with more precise calculation awaiting the 2000 Census. As shown in Table 3, the CPS data show cumulative flows of post-1990 employed migrants to have reached some 77,000 by 1997, for an annual average flow of 10,000. These figures exclude those who have been born in other countries and migrated to the United States through Canada, and include temporary workers. The number who are highly educated and skilled permanent migrants, and hence the focus of brain drain discussions, is much less than 10,000. Next year's census will provide more definitive numbers, but the past matches between census and CPS data are close enough that very large surprises are unlikely.

## What triggers migration?

This section will review the empirical literature on international migration with an eye to seeing what circumstances or policies might be determining current flows. The international flows will be compared, in terms of their economic and non-economic determinants, to inter-provincial migration in Canada and interstate migration in the United States. The primary economic determinants examined in the literature include income differentials and employment prospects.

One striking feature of all the results is the extent to which interprovincial and interstate mobility of labour is many times higher than that between countries. Another feature of the evidence appears to be that those born in Canada are more willing to move, either interprovincially or internationally, than are those born in the United States.

I have recently estimated interprovincial, interstate and Canada-U.S. population mobility on the basis of data from the Canadian and U.S. censuses. In the Canadian census, respondents report their current province of residence and their province or country of birth. The U.S. census collects similar data for state of residence and states or countries of birth. For each country, it is therefore possible to estimate the relative likelihood of cumulative internal and international migration, after adjusting for the primary effects of distance, size and per capita incomes as determinants of migration. The results[9] show that for both countries there is a sharply higher probability that a migrant to a state or province comes from another part of the same country rather than from the other country. Based on all cumulative migration up to the 1990-91 censuses in the two countries, a resident of a Canadian province was 100 times more likely to have come from another province than from the United States, after adjusting for economic size and distance. The corresponding results for residents of the United States shows them to be seven times more likely to have migrated from another state than from a Canadian province of similar economic size and distance. This reveals once again that internal migration is much more likely than international migration, and also shows that Canadians have traditionally been much more likely to migrate to the United States than vice versa. One explanation for the greater likelihood of finding Canadian-born in the United States is that the Canadian-born are more mobile than the U.S.-born, whether moving within their country of birth or moving to the other country[10]. Another reason for the greater flows of south-bound migrants is that the 49$^{th}$ parallel provides a membrane through which northbound information travels much more readily than southbound flows. The average Canadian has all the U.S. channels on his or her TV set, along with much U.S. information and programming on the Canadian channels. In the U.S. media, and on the U.S. cable systems, there is almost nothing about Canada. Thus Canadians regard the United States as known territory, while most residents of the United States have no reason to ever think what it might mean to live in Canada. Since information and familiarity spur migration, this asymmetry of information may help to explain migration patterns. For both countries, however, international migration remains far less likely than is internal migration.

[9] Reported in Chapter 5 of Helliwell (1998), especially Tables 5.1 and 5.2

[10] In particular, comparing the income coefficients of equation (ii) in Table 5.1 with those of equation (ii) of Table 5.2 shows that income differentials are far more likely to spur interprovincial than interstate migration. Adding immigration from the other country (as in equations (iv) to (vi)) does not change this result, but there is little additional data being added, since neither census asks for the state or province of birth of those born in the other country.

Among those who do migrate, whether domestically or abroad, there is a preponderance of the highly educated, partly because they are more likely to have skills in demand, but also because they are more likely to have contacts in and knowledge about the possible places to move[11]. Studies of Canadian emigration, based on aggregate data mainly for the 1960s, confirm the importance of economic factors, with employment opportunities, as measured by the inverse of the unemployment rate, dominating relative incomes as the primary economic motivation[12]. In the light of the importance of relative unemployment rates, and especially of employment prospects in the target of migration, the 1980s and 1990s, and especially the first half of the 1990s, should have been a time of high migration from Canada to the United States. The unemployment rate gap between the two countries reached 4% in the first half of the 1990s, driven mainly by a reduction in the U.S. rate, indicative of growing job opportunities in the United States. It is possible, using the earlier research on the economic determinants of emigration, to estimate what the effects of differing macroeconomic circumstances contributed to migration from Canada to the United States during the first half of the 1990s. If we use one percentage point of reduced U.S. unemployment, averaged for each of the years 1990 through 1996, as a conservative measure of the stronger macroeconomic performance, and hence job creation, in the United States[13], the implied emigration to the United States would have been about 10,000 per year[14]. This estimate is based on migration behaviour in previous decades, and is subject to a large margin of error, but does signal that migration from Canada to the United States in the 1990s has been surprisingly small, when seen in the light of what was a widening gap between job opportunities in Canada and those in the the United States. At the end of the century, as unemployment rates in the two countries move closer together, the job opportunities gap is lessening, and the incentives to migrate south are correspondingly lower.

To the extent that migration of the highly skilled may be triggered by different factors, survey data reported by Grubel and Scott suggests that job opportunities and challenges are even more important for the highly educated. It is also true that for many such workers, particularly in health care, education, and government-supported fundamental research, the 1990s have seen large cuts in government spending induced by budget pressures. As federal and provincial finances are returning to balance, both levels of government are starting to rebuild their diminished capacities to provide health care, higher education and research. In addition to this likely restoration of financial support, job opportunities for new entrants to the knowledge professions, especially

[11] Borjas (1992, Table 1.8) shows that in 1980, recent migrants from Canada to the United States had, on average 2.0 years more schooling and 18% higher earnings than the native U.S. population, as well as a lower unemployment rate. CPS data echo these results for more recent migrants, and also show them to be much less likely than are other U.S. residents to be in receipt of welfare and other social safety net payments.

[12] See Helliwell, Shapiro, Sparks, Stewart, Gorbet and Stephenson (1971), especially Chapter 5 of Part 1, and pages 42-3 of Part 2.

[13] See the papers and comments in Riddell and Sharpe eds., (1998) for evidence that the unemployment rate gap in the 1990s has been to a substantial extent determined by macroeconomic differences.

[14] The emigration equation in RDX2 (Helliwell et al 1971) made use of the inverse unemployment rate for the United States, to reflect the increasing importance of the unemployment rate, when viewed as a measure of job vacancies, as the unemployment rate gets closer to zero. Taking a drop from 6% to 5% as a basis for the calculations, the implied increase in job opportunities is .033, to be multiplied by the estimated coefficient sum of .3713 to get a quarterly emigration effect measured as a percentage of the labour force population. Using 20.3 million for the 1996 size of the Canadian population between 15 and 64, this translates to an annual migration flow of .3713*.033*4.*.01*20300000.=9,950. The standard error of this estimate is about 4,300.

those employed by universities, will be enhanced by the large bulge of retirements in the next ten years. It is noteworthy that the coming retirement surge is the echo of the massive hiring by universities in the 1970s (larger in Canada than in the United States), which itself was largely responsible for ending the earlier and much larger exodus of highly educated Canadians in the 1960s.

Finally, it needs emphasizing that since international migration is such a rare event, relative to either domestic migration or staying near one's roots, it probably requires a substantial accumulation of push and pull factors. In addition, given the importance of networks of contacts and information, which serve to keep people near home, as well as to let them follow pathways blazed by others, migration is likely to be characterized by bunching, by waves, and to lead to very uneven patterns. Why else would so many people from the same rural village in Europe be found decades later in the same census tract of suburban Toronto? Three implications of this unevenness and discontinuity are worth emphasizing. First, they make migratory flows, especially in their geographic and timing details, very difficult to predict. Second, they make anecdotes and small surveys a problematic source of evidence about the size and nature of migratory flows. Third, the fact that international migration is such an important and unusual decision for individuals and families probably leads them to compare, to the extent they are able, the whole character of life and society in their old and potential new countries. Where the push factors are strong and immediate, as with some refugees fleeing for their lives, details about their place of refuge may matter little, a matter to be sorted out and possibly adjusted by subsequent moves. For those moving from Canada to the United States, the balancing of push and pull factors is likely to be more even, and the choice of the type of community and country more deliberate. On the other hand, north-south migrations between Canada and the United States typically involve the burning of few bridges, so that experimental and potentially reversible moves may be much more frequent.

## How Much Do Policies Influence Migration Decisions?

Following on from the discussion in the previous section about the importance and infrequency of the migration decision, it should be expected that narrow comparisons of house prices and personal tax rates are likely to be subsumed in a larger calculation based on permanently sustainable lifestyles and incomes. On the other hand, the increasing frequency of temporary movements under the FTA/NAFTA provisions may encourage more short-term migration aimed at maximizing take-home pay, leaving open future choices about where families will be raised and roots planted[15]. As Kesselman (1998) points out, the fact that geography and political jurisdiction frequently co-exist was used as the basis for Tiebout's (1956) model explaining how political

[15] International tax competition, especially for capital income, raises the possibility, more tangentially related to brain drain issues, that incomes once saved will be transferred to a tax haven or other low-tax jurisdiction. The implied pressures on national tax systems, and the policy issues thereby raised, are the focus of the recent Mintz report on business taxation in Canada, and of the subsequent panel discussion published in the Canadian Tax Journal. Analysis by Statistics Canada shows an increasing trend of emigrating tax files during the 1990s, from 14,450 in 1990 to 21,300 in 1997, averaging 21,300. This includes retirees as well as those currently employed, and covers moves to to all countries. The proportion of tax filers moving to the United States may be more or less than the typical U.S. 50% share of Canadian emigrants

jurisdictions can offer quite different packages of services and tax rates, with individuals voting with their feet to find the package most suiting their tastes and values. When the choice is among countries, rather than among municipalities, mobility is much less, the fiscal and social packages can be, and are, much more different, but the basic point remains that those who move face not only different tax rates but different patterns and types of public services. Perhaps even more relevant to the study of migration of the well-educated and well-off, countries differ not only in the size and efficiency of their public services and transfer payments, and in their average tax rates, but in the distribution of those costs and benefits among different groups of taxpayers and beneficiaries.

How do these packages of taxes and services look to those deciding whether to live and work in Canada or the United States? In recent discussions of the brain drain, much emphasis has been placed on bilateral comparisons of income tax rates between Canadian and U.S. cities. These calculations, because they can be easily made, are both natural and compelling. They are problematic, however, since income tax rates vary greatly among states in the United States, income taxes are variable proportions of total taxes, and the balance between taxes paid and services received differs greatly between the two countries, and among individuals in different economic and social circumstances. Overall, health care and social safety net policies absorb about the same share of GDP in the two countries and hence, one might infer, these policies and their financing would not need to have a big effect on migration decisions. But as the studies in Card and Freeman (1993) show, the structure and financing of the two systems differ substantially, as do their efficiency and coverage. Although the total of the health and other social safety net policies costs about 16% of GDP in both countries, this is the total of a health care system that costs 4% more of GDP in the United States than in Canada, and other social safety net policies that, at least in the early 1980s, cost almost three times as much in Canada as in the United States (Card and Freeman 1993), and would, if Canadian rules had been applied to the U.S. population, have cut U.S. poverty rates by more than half (Blank and Hanratty 1993). For a brain drain migrant, not planning to need social safety nets, and likely to be covered by employer-provided health insurance, the lower tax rates in many U.S. jurisdictions could provide a net fiscal incentive to move[16]. Since these studies were undertaken, social safety nets have been under increasing pressure from increased demands and decreasing finance in both countries, been made less generous in both countries, the pre-tax and post-tax distributions of income have become more unequal in the United States, as compared to those in Canada, and the education premium in wage rates has risen in the United States relative to Canada. All of these factors may have increased the net attraction of migration among the better-educated.[17]

[16] However, as the studies in Corak, ed. (1998) demonstrate, it is important, especially for migrants who intend to stay, to think not just about current tax rates and public expenditures, but what those policies will look like in future decades and for future generations.

[17] Globerman (1998), while noting the lack of an upward trend in permanent migration to the United States, argues that the greater inequality of the pre-tax and post-tax incomes in the United States is likely to increase the incentives for the highly-paid to move from Canada to the United States. Borjas (1992) finds a similar effect of income inequality on overall migration patterns to the United States.

Beyond the overall package of taxes and public services, special attention has been given, especially in the context of brain drain discussions, to the structure of education finance. Grubel and Scott (1977), Bhagwati and Martington (1976), and DeVoretz and Laryea (1998), among others, have all considered the fact that brain drain migrants take with them their own stocks of taxpayer-supported educational capital, and have considered or advocated some means of recouping some or all of these costs by means of an exit tax or an educational loan that is forgiven only for those who remain to work where they acquired their subsidized education. The issue has special relevance for the issue of the brain drain between Canada and the United States, since Canadian tax rates are higher than those in the United States, and education, and especially higher education, receives more of its support from taxes in Canada than in the United States. The issue then arises as to whether international mobility of the highly educated is now high enough to threaten this difference in the financing of education between the two countries. The DeVoretz and Laryea proposal to tax emigrants for the value of the tax-supported education they are taking with them is one reaction to this. Others have suggested that the current pattern is likely to be sustainable, perhaps supported by a continuation of the current move towards higher university fees in the more expensive professional schools.[18]

There is a final set of policies influencing the brain drain by means of the entry rules for the countries receiving immigrants. Such policies are generally intended to combine some skill-based selection with other criteria based more on humanitarian grounds, including especially refugee status. Changes in U.S. and Canadian policies have followed somewhat parallel paths, with country preferences or quotas being replaced by systems with more reliance on domestic need for the migrants' skills. Removal of Western Hemisphere preference made it harder for Canadians in general to migrate to the United States, while the increasing reliance of education and skills has left considerable room to move for the highly skilled, who, as has been seen, were already the ones most likely to migrate.

## Summary of the Evidence and its Implications for Policies and Research

What can be concluded from the empirical studies of current and earlier international movements of the highly skilled? First, the highly skilled are much more mobile than are those with less education. Second, the data show that even the highly skilled are, by at least an order of magnitude, far more mobile within their country of origin than between countries. In many disciplines, especially for the higher levels of qualification, international experience is a valuable or necessary part of the training. Those exposed to international training and experience are probably more likely to migrate than are others who have not made as many foreign contacts. Third, the

[18] Allen (1998) argues that on average the higher personal incomes of those with higher educations lead them to pay Canadian taxes that are higher by enough to repay the existing levels of tax support for higher education. This repayment does not take place for emigrants, of course, and that is the basis for the exit tax proposals. Emery (1998) argues that the taxpayer subsidies are especially high only in second-entry professional programmes and business schools, so he prefers, instead of an education-based exit tax, an extension of current moves in several provinces to higher tuition fees in such courses.

evidence shows that international migratory flows of the highly skilled are greater when there are large gaps in job opportunities or living standards between the sending and the receiving countries.

These three general conclusions help to explain the main facts of the current migrations between Canada and the United States, and to suggest why the current migrations are so much smaller than thirty years ago. What is the shape of the explanation? First, the greater mobility of the highly educated helps to explain their over-weighting in migratory flows between Canada and the United States[19]. Second, the much smaller size of the 1990s brain drain from Canada to the United States, compared to the 1960s, can be explained as the net result of four main factors with offsetting effects. The two dominant factors, both of which tend to make the 1990s flows smaller than those in the 1950s and 60s, are the much smaller income gap between the two countries and the fact that the availability of higher education has increased greatly in Canada over the same period. In 1960, per capita GDP in Canada was 40% below that in the United States, while by 1990 the gap was less than one-third as great. In the 1960s, the availability of graduate studies in Canada was far less than in the United States, and in many disciplines the standard career track for academics involved obtaining a PhD in another country, most often the United States[20]. The change between the 1960s and the 1990s in this regard is quite dramatic. To provide a particular example, among almost 600 active research economists in Canada in 1990, most of whom were also teaching in universities, the percentage with Canadian PhDs rises from 9% for those with 1950s PhDs to 14% for the 1960s PhDs, 35% for the 1970s and 62% for the 1980s.[21]

The two offsetting factors include the widening gap in employment opportunities between Canada and the United States in the 1990s, relative to the 1970s and 1980s, and the generally lower costs of international travel and communications. The former factor is most important for medical professionals and academics, who have faced a situation of increasing supply combined with declining employment opportunities, usually driven by fiscal retrenchment. These factors have been evident to some extent in all countries, but are much more important in Canada than in the United States. For example, Murphy, Riddell and Romer (1998) have documented a rising skill premium in the United States compared to Canada, and are able to explain this in terms of larger Canadian increases in the supply of skills.

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[19] This result is often attributed to immigration rules that favour the highly skilled, and such an influence is clearly in evidence in some periods. However, the higher mobility of the more educated shows up also in studies of interprovincial migration, where the decisions are entirely in the hands of the migrants.

[20] The fact that PhDs produced in Canada are likely to seek and find employment nearby is shown by analysis of the place of residence of UBC PhDs of different vintages. As the annual number of PhDs produced has grown rapidly over the past twenty-five years, the number employed and living in British Columbia has grown even faster.

[21] The data are from Helliwell (1993, 42). The increased size and stature of graduate programmes in Canadian universities will also have increased at least the gross number of highly trained migrants from Canada to the United States, since Canadian programmes now attract high-level candidates from around the world, including the United States, and these foreign students may be more likely than Canadian-born students to search for and accept positions outside Canada upon receipt of their graduate degrees. The re-export of foreign-born graduates may represent a large part of the total emigration. For example, the 1995 National Graduates Survey shows that in science and engineering the proportion of foreign-born students is as high as the proportion of graduates who are living and working in other countries, suggesting that any loss of Canadian-born graduates emigrating is at least offset by foreign students in Canadian universities who subsequently settle in Canada.

The main conclusion to be drawn from this paper's review of the brain drain data is that the 1990s movements of educated Canadians to the United States are surprisingly small, when viewed relative to past movements of educated Canadians to the United States, current perceptions, and past and current immigration to Canada from other countries. In the light of the 1990s increases in the educational pay premium in the United States, the increasing relative supply of Canadians with higher education, and the lower unemployment rates in the United States, earlier research suggests that there should have been a large increase in migration to the United States during the 1990s. Although there clearly have been increased movements of goods, services, and temporary workers between the two countries in the wake of the FTA, the number of Canadian-born workers who have migrated to the United States since 1990 and are still there now, has averaged about 10,000 per year, about half of whom have university degrees. Since this number is small relative to previous history, it might or might not be reduced still further as the unemployment rate gap continues to narrow between the two countries. In those areas where the movements have been significant and widely noted, as with nurses, some high technology workers, and some university-based researchers, the movements are likely to be reduced as the relative supply situation becomes more similar in the two countries, driven by some combination of reduced fiscal pressures in Canada, reduced excess demand in the United States, and forthcoming retirements in Canada.

Since the actual flows are modest, the lessons for policy changes are correspondingly muted. In short, the modest scale of the movements means that it would be a mistake to use the brain drain as a spur for changes to taxes and expenditures that did not otherwise pass the tests of economic and political logic. Migration acts to partially mediate international differences in the balance between the demand for and supply of specialized skills. This is just one more channel in the international transmission of macroeconomic conditions from one country to another, helping to moderate the unemployment effects of domestic shocks and to expose the economy to shocks arising elsewhere. Since international migration is so small relative to domestic migration, and since all migration is a relatively rare event, the quantitative effect of migration on the transmission of macroeconomic disturbances is small, even where immigration policies are specifically targeted to help meet pressing job vacancies. There is some evidence that the availability of a pool of skilled and willing immigrants may have helped to fill job vacancies, and hence to lessen inflationary bottlenecks, in occupations or locations that are less favoured by domestic residents[22]. In terms of current brain drain discussions, the rapid and sustained U.S. employment growth in the 1990s, coupled with a rising education premium, provided a broader range of better paying job opportunities for many educated Canadians. The possible downside to this is that those who have pulled up their roots and set them down elsewhere may be harder to bring back when the domestic needs are greater. The burden of the data examined in this paper, however, is that the numbers involved are small enough, relative to either existing stocks of skills, or the scale of current training, that they are not likely to have a large or long-lasting effect on the availability of skills in Canada.

[22] Two examples might include the high proportion of immigrant doctors in Canadian northern locations, and evidence that immigration to Australia helped to match job vacancies with willing workers, and hence to reduce frictional unemployment.

Given the costs of migration, any brain drain of the highly skilled increases the incentive to provide a stable and sustainable environment for the training and employment of all workers, but especially those in fields where there are positive national spillovers from domestic employment. The foremost include health, education[23], and research and development[24], where governments appear as major employers and financial backers. While there are incentives to take education where it is cheap and then work where wages are high, it should be noted that in the education of PhDs, where post-degree mobility seems to be highest, the financing patterns are quite similar in Canada and the United States, and there may not be much taxpayer subsidy involved. The reason for this is that almost all PhD students work as teachers and researchers during their PhD programmes, and generally produce high value output for very low wages in both capacities. Thus it might be argued that PhD programmes are cost-effective ways of achieving R&D and education simultaneously, regardless of where the finished PhDs are subsequently employed. I am not aware of research that attempts to systematically measure the contributions of PhD students to research and teaching. Since it is clearly relevant to any assessment of where R&D support should be directed, and to any assessment of the costs and benefits of migration, it should count as an important item on any list of research gaps.

There are also obvious gaps in the structure and detail of estimates of migration between Canada and the United States. Ideally, these gaps should be filled in a way that enriches the data already available from census and labour force surveys. There is also much more that can be learned from the systematic analysis of the movements of sample groups of special interest, such as graduates of various parts of the Canadian educational system. In the meantime, the data and analysis provide no evidence of a current crisis, or any great cause for alarm.

[23] The benefits of higher and more equally distributed standards of health and education extend beyond the returns accruing to those in better states of health and knowledge, since both health and education appear to raise several intangible features of community health sometimes referred to as social capital. For example, Helliwell and Putnam (1998) use U.S. survey data to confirm a robust linkage between education and measures of trust and community participation, and Knack and Keefer (1997) and Helliwell and Putnam (1995) have found some evidence that these measures of social capital in turn have positive effects on aggregate economic performance.

[24] Research by Coe and Helpman (1995) shows that R&D in the OECD countries has important domestic and international spillovers, while calculations in Helliwell (1998, Table 6.1) show that the Coe and Helpman estimates imply strong border effects for R&D. Thus research done in Canada has a much large effect on domestic productivity than does the same amount of research spending taking place in the United States.

## Appendix I: References

Allen, Robert C. (1998) "Paying for University Education in B.C.." U.B.C. Department of Economics Discussion Paper 98-07.

Bhagwati, J.N. and M. Martington, eds. (1976) **Taxing the Brain Drain: A Proposal** (Amsterdam, North-Holland) Volumes 1 and 2.

Blank, Rebecca M., and Maria J. Hanratty (1993) "Responding to Need: A Comparison of Social Safety Nets in Canada and the United States." In Card and Freeman, eds.(1993)

Borjas, George J. (1992) "National Origin and the Skills of Migrants in the Post-War Period." In George J. Borjas and Richard B. Freeman, eds., **Immigration and the Work Force**. (Chicago: University of Chicago Press).

Card, David and Richard B. Freeman, eds., (1993) **Small Differences That Matter: Labour Markets and Income Maintenance in Canada and the United States**. (Chicago: University of Chicago Press)

Murphy, Kevin W., W. Craig Riddell and Paul M. Romer (1998) "Wages, Skills and Technology in the United States and Canada." **NBER Working Paper** No. 6638. (Cambridge: National Bureau of Economic Research)

Coe, D.T. and E. Helpman (1995) "International R&D Spillovers." **European Economic Review 39**: 859-87.

Corak, Miles, ed. (1998) **Governmental Finances and Generational Equity** (Ottawa: Statistics Canada)

DeVoretz, Don and Samuel A. Laryea (1998) **Canadian Human Capital Transfers: The USA and Beyond**. (Toronto: C.D. Howe Institute)

Emery, J.C. Herbert (1998) **The Financing of Higher Education and the Brain Drain.** (Vancouver: The Fraser Institute): Paper No.5.

Globerman, Steven (1998) **NAFTA and Labour Markets**. (Vancouver: The Fraser Institute Conference on the Brain Drain, Paper No.4).

Grubel, Herbert (1998) **The Effect of the Brain Drain on the Welfare of Canadians**. (Vancouver: The Fraser Institute Conference on the Brain Drain, Paper No.1).

Grubel, Herbert and Anthony Scott (1977) **The Brain Drain: Determinants, Measurement and Welfare Effects**. (Waterloo: Wilfrid Laurier University Press)

Helliwell, John F. (1993) "What Have Canadian Economists Been Doing for the Past Twenty-Five Years?" **Canadian Journal of Economics 26**(1): 39-54.

Helliwell, John F. (1998) **How Much Do National Borders Matter?** (Washington DC: Brookings Institution).

Helliwell, John F., Harold T. Shapiro, Gordon R. Sparks, Ian A. Stewart, Frederick W. Gorbet, and Donald R. Stephenson (1971) **The Structure of RDX2**. (Ottawa: Bank of Canada, Staff Research Studies 7, Parts 1 and 2)

Helliwell, John F. and Robert D. Putnam (1995) "Economic Growth and Social Capital in Italy." **Eastern Economic Journal 21**(3): 295-307.

Helliwell, John F. and Robert D. Putnam (1998) "Education and Social Capital." (Unpublished: University of British Columbia)

Kesselman, Jonathan R. (1998) **Policies to Stem the Brain Drain - Without Americanizing Canada.** (Vancouver: The Fraser Institute Conference on the Brain Drain, Paper No.7).

Knack, Stephen, and Philip Keefer (1997) "Does Social Capital have an Economic Payoff? A Country Investigation." **Quarterly Journal of Economics 112**(4): 1251-88.

McCallum, John C.P. (1995) "National Borders Matter: Canada-U.S. Regional Trade Patterns" **American Economic Review 85** (June 1995): 615-23.

Riddell, Craig and Andrew Sharpe, eds. (1998) **The Canada-US Unemployment Rate Gap. Canadian Public Policy 24** (Special Issue, February 1998)

Scott, Anthony (1970) "The Brain Drain - Is a Human Capital Approach Justified?" In Hansen, W. Lee ed. **Education, Income, and Human Capital**: (New York: Columbia University Press in "Studies in Income and Wealth" Vol. 35): 241-93.

Schmidley, A. Diane and J. Gregory Robinson (1998) **How Well Does the Current Population Survey Measure the Foreign Born Population in the United States?**: (Washington: US Bureau of the Census, Population Division): Technical Working Paper No.22

Shoven, John and John Whalley, eds. (1992) **Canada-US Tax Comparisons**. (Chicago: University of Chicago Press for NBER)

Tiebout, Charles M. (1956) "A Pure Theory of Local Public Expenditures." **Journal of Political Economy 64**: 416-24

United Kingdom, Committee on Manpower Resources for Science and Technology (1967) **The Brain Drain: Report of the Working Group on Migration.** (London: HMSO Cmnd 3417).

Truesdell, Leon E. (1943) **The Canadian Born in the United States**. (New Haven: Yale University Press; Toronto: Ryerson).

United Nations Report of the Secretary General (1968) **Outflow of Trained Personnel from the Developing Countries** (New York: United Nations A/7294).

United States (1968) **The Brain Drain of Scientists, Engineers and Physicians from the Developing Countries into the United States: Hearings Before a Subcommittee of the Committee on Government Operations, House of Representatives**. (Washington: U.S. Government Printing Office)

United States (1998) **We, the American Foreign Born**. (Washington: U.S. Census).

**Table 1 - Canadian-Born Population in the US: 1990 Census and 1994-1997 CPS***

| | 1980** | 1990 Census | 1994 CPS | 1995 CPS | 1996 CPS | 1997 CPS | 1998 CPS*** |
|---|---|---|---|---|---|---|---|
| **Total** | 843 | 772 | 679 | 677 | 660 | 542 | 583 |
| **Age Groups** | | | | | | | |
| 25-44 | n.a. | n.a. | 208 | 206 | 235 | 204 | |
| 45-64 | n.a. | n.a. | 201 | 196 | 172 | 154 | |
| 65+ | n.a. | n.a. | 191 | 175 | 183 | 131 | |

* US Bureau of the Census Current Population Survey (CPS) data available fromwww.census.gov. The 1997 age-group estimates are unpublished tabulations requested by Statistics Canada. All numbers in thousands. The adjusted census number for 1990 is from Schmidley and Robinson (1998).

** From "We the American Foreign Born" on the U.S. Census website www.census.gov

*** This number was calculated from the March 1998 CPS, using the same weighting factor as was used by the US Bureau of the Census for the 1996 and 1997 CPS numbers for Canadian born residents of the US

## Table 2 - Canadian Population and Growth Components

| Period | Net Natural Increase[1] | Immigration[2] | Emigration[3] | Emigration / Immigration | Census Population at end of Period |
|---|---|---|---|---|---|
| 1851-1861 | 611 | 352 | 170 | 0.48 | 3230 |
| 1861-1871 | 610 | 260 | 411 | 1.58 | 3689 |
| 1871-1881 | 690 | 350 | 404 | 1.15 | 4325 |
| 1881-1891 | 654 | 680 | 826 | 1.21 | 4833 |
| 1891-1901 | 668 | 250 | 380 | 1.52 | 5371 |
| 1901-1911 | 1025 | 1550 | 739 | 0.48 | 7207 |
| 1911-1921 | 1270 | 1400 | 1089 | 0.78 | 8788 |
| 1921-1931 | 1360 | 1200 | 971 | 0.81 | 10377 |
| 1931-1941 | 1222 | 149 | 241 | 1.62 | 11507 |
| 1941-1951[4] | 1972 | 548 | 379 | 0.69 | 13648 |
| 1951-1956 | 1473 | 783 | 184 | 0.24 | 16081 |
| 1956-1961 | 1675 | 760 | 278 | 0.37 | 18238 |
| 1961-1966 | 1518 | 539 | 280 | 0.52 | 20015 |
| 1966-1971[5] | 1090 | 890 | 427 | 0.48 | 21568 |
| 1971-1976[6] | 931 | 1053 | 492 | 0.47 | 23518 |
| 1976-1981 | 977 | 771 | 366 | 0.47 | 24900 |
| 1981-1986 | 987 | 677 | 360 | 0.53 | 26204 |
| 1986-1991 | 987 | 1199 | 279 | 0.23 | 28111 |
| 1991-1996 | 908 | 1170 | 230 | 0.20 | 29959 |

1. Calculated using (total births) - (total deaths)

2. Starting with July 1, 1971, immigration figures include Landed Immigrants, returning Canadians plus net change in the numbers of non-permanent residents.

3. Emigration figures are estimated by the residual method

4. Data for the components of growth shown for 1941-1951 were obtained by excluding data for Newfoundland

5. The June 1, 1971 figure is the Census count without adjustment for the net Census undercount. The July 1, 1971 population adjusted for the net Census undercount is 22,026,000

6. Starting with 1971, the reference date is July 1 instead of June 1 and population estimates are based on Census counts adjusted for net undercounts

**Source: Statistics Canada, Demography Division**

**Table 3 - Selected Characteristics of the Canadian Born in the US who entered the US to live Since Jan.1, 1990**

| | 1994 CPS | 1995 CPS | 1996 CPS | 1997 CPS |
|---|---|---|---|---|
| (All numbers in thousands) | | | | |
| | | | | |
| **Total** | 104 | 126 | 105 | 116 |
| | | | | |
| **Age Groups** | | | | |
| 25-44 | 53 | 46 | 54 | 68 |
| 16-64 | 99 | 84 | 81 | 91 |
| | | | | |
| **Sex** | | | | |
| Male | 45 | 66 | 51 | 68 |
| Female | 59 | 60 | 54 | 48 |
| | | | | |
| **Education** | | | | |
| # with Bachelor's Degree | 21 | 18 | 18 | 37 |
| % of total with Bachelors | 20.2% | 14.3% | 17.1% | 31.9% |
| # with Graduate/Professional Degrees | 10 | 16 | 20 | 5 |
| % of total with Grad/Prof. Degrees | 9.6% | 12.7% | 19% | 4.3% |
| | | | | |
| **Income in Previous Year** | | | | |
| (1993,1994, 1995, 1996) | 9 | 18 | 15 | 22 |
| | | | | |
| **Labour Force Status** | | | | |
| Employed | 46 | 52 | 63 | 77 |
| % Employed of Total | 0.442 | 0.413 | 0.6 | 0.664 |